

Bachelor of Science in Data Science

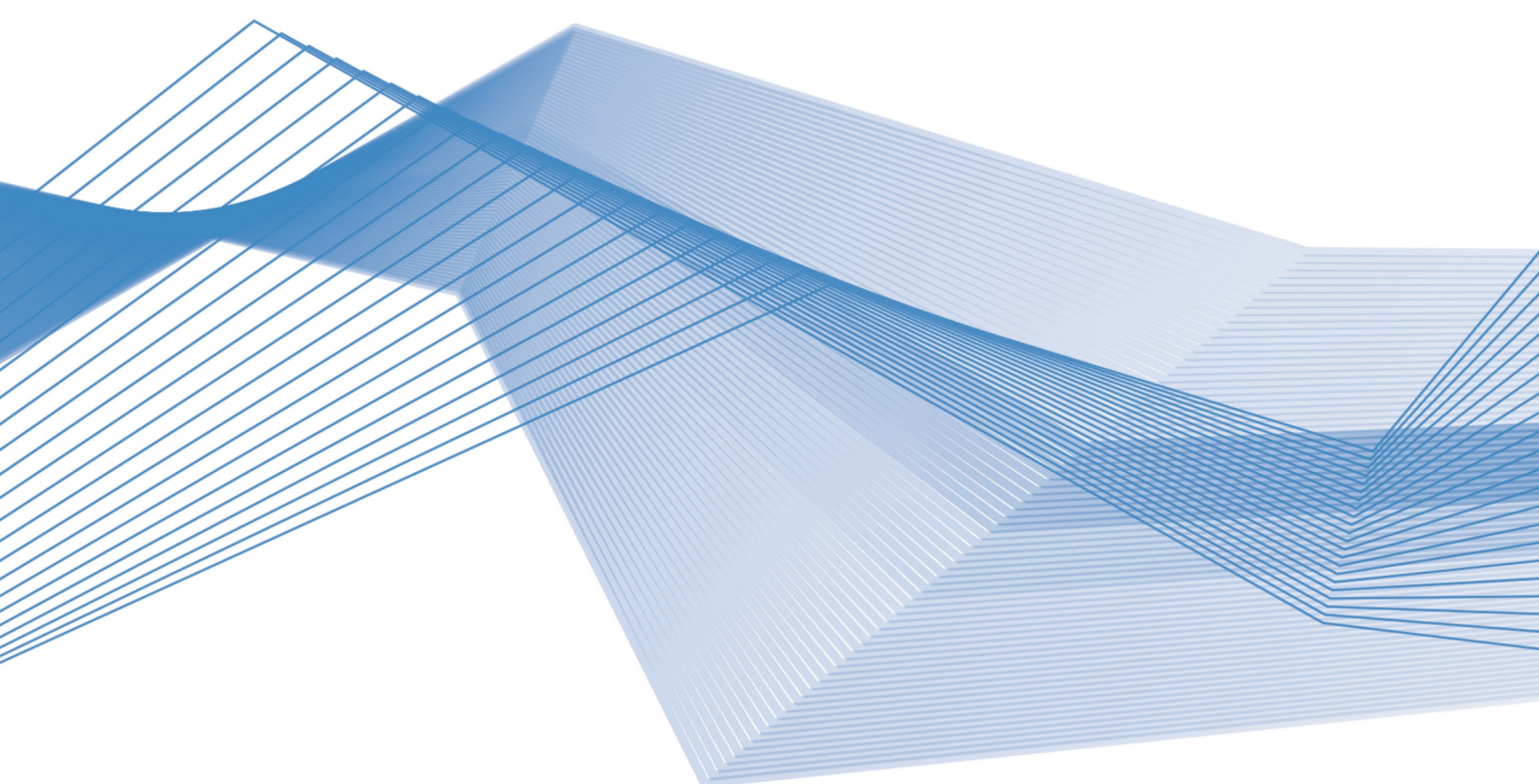
理學士(數據科學)

Bachelor of Engineering in

Data and Systems Engineering

工學士(數據與系統工程)

For Common First Year Students



Student Handbook
2019-2020

(Please note that the information given in this Handbook is accurate at the time of printing in August 2019. Changes to the information may be made from time to time without prior notification.)

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CITY UNIVERSITY OF HONG KONG SCHOOL OF DATA SCIENCE

Common First Year

Student Handbook (2019-2020)

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1 VISION AND MISSION OF SCHOOL OF DATA SCIENCE

Vision

SDSC is envisioned to be a world-class, leading school of excellence in data science education and research to address key challenges in the field.

Mission

SDSC's mission is:

- to serve as the campus-wide educational resource in data science to foster interdisciplinary collaborations across campus and the globe;
- to train high calibre students to equip them with the urgently needed tools to engage in leading-edge activities and research in data science;
- to develop cutting-edge and internationally competitive research with local/regional/global impact in targeted areas of data science;
- to produce a new breed of data science professionals engaging in data science related activities;
- to develop technology and services in the area of data science to serve local and international needs.

2 DEGREE REQUIREMENT FOR 4-YEAR DEGREE PROGRAMMES

2.1 Minimum Number of Credit Units Required for the Award

Curriculum Structure		Credit Requirement
Gateway Education requirement	University Requirements	9 credit units
	Distributional Requirements	12 credit units
	School-specified Requirements	9 credit units
College/School requirement		18 credit units
Major requirement		54 to 63 credit units
Free electives / Minor (optional)		9 to 18 credit units
Minimum number of credit units required for the award		120 credit units
Maximum number of credit units permitted		144 credit units

Normal Period of Study

	Normative 4-year Degree
Normal period of study	4 years
Maximum period of study	8 years

2.2 Gateway Education

(Please refer to http://www.cityu.edu.hk/edge/ge/ge_requirements_new.htm)

Requirements	Credit Units
<u>University requirements</u>	
English	
• GE1401 University English	3 credit units
• Discipline-specific English	3 credit units
GE1501 Chinese Civilisation – History and Philosophy	3 credit units
<u>Distributional requirements</u> Area 1: Arts and Humanities Area 2: Study of Societies, Social and Business Organisations Area 3: Science and Technology	12 credit units (At least one course from each of the three areas)
<u>College/School-specified courses</u> ^	9 credit units
Total	30 credit units

^College/School-specified courses for fulfilling the Gateway Education requirement

Course Code	Course Title	Level	Credit Units	Remarks
MA1508	Calculus	B1	4	
CS2311/CS2315	Computer Programming	B2	3	
SDSC1001	Introduction to Data Science	B1	2	

2.3 English Language Requirement

Normative 4-year degree students who passed the 6 credit units of specified GE English courses are recognized as fulfilling the University's English Language Requirement.

Students scoring below Level 4 in HKDSE English Language or Grade D in HKALE AS-level Use of English or students who do not possess an equivalent qualification are required to complete two 3-credit unit courses, EL0200A English for Academic Purposes 1 and EL0200B English for Academic Purposes 2, prior to taking the GE English courses. Students who demonstrate that they have achieved a grade B or above in their overall course results for EL0200A will achieve 3 credits and also be considered to have satisfied the pre-requisite for entry to the GE English courses without needing to take EL0200B. The credit units of EL0200A and EL0200B will not be counted towards the minimum credit units required for graduation and will not be included in the calculation of the cumulative grade point average (CGPA). However, they will be counted towards the maximum credit units permitted.

2.4 Chinese Language Requirement

Students scoring below Level 4 in HKDSE Chinese Language, or below Grade D in HKALE AS-level Chinese Language and Culture will be required to complete a 3-credit unit course CHIN1001 University Chinese I. The 3 credit units will not be counted towards the minimum credit units required for graduation and will not be included in the calculation of the cumulative grade point average (CGPA). However, they will be counted towards the maximum credit units permitted.

2.5 College/School Requirement

Course Code	Course Title	Level	Credit Units	Remarks
MA1503	Linear Algebra with Applications	B1	4	
MA2506	Probability and Statistics	B2	4	
MA2508	Multi-variable Calculus	B2	4	
SDSC2001	Python for Data Science	B2	3	
CS3402	Database Systems	B3	3	

2.6 Major Requirement

Minimum Requirement	Bachelor of Science in Data Science (BSc DS)	Bachelor of Engineering in Data and Systems Engineering (BENG DSE)
Core Courses	33 credit units	54 credit units
Elective Courses	21 credit units	9 credit units
Free Elective	18 credit units	9 credit units

2.7 Classification of Award

Classification	CGPA
1 st Class	CGPA 3.5 or above
2 nd Upper	CGPA 3.00 – 3.49
2 nd Lower	CGPA 2.50 – 2.99
3 rd Class	CGPA 2.00 – 2.49
Pass	CGPA 1.70 – 1.99

3 COMMON FIRST-YEAR AND MAJOR OPTIONS

Students admitted to the normative 4-year degree programme will study a broad range of Gateway Education (GE) courses together with core-curricular courses designed by the School of Data Science. At the end of Semester B 2019-20, students will be allocated to a major of their choice, subject to the availability of places and selection criteria set by individual majors.

Major Options

Bachelor of Science in Data Science

Bachelor of Engineering in Data and Systems Engineering

Major Leader

Dr ZHOU, Xiang

Dr ZHANG, Zijun

4 FIRST-YEAR CURRICULUM

Subject Area	Course Code	Course Title	Credit Units
Gateway Education (30 credit units)			
English	GE1401 & GE2401	University English (3 CU) English for Science (3 CU)	6
Chinese	GE1501	Chinese Civilisation - History and Philosophy	3
GE Courses^	GE courses from the distributional areas: Area 1: Arts and Humanities Area 2: Study of Societies, Social and Business Organisations Area 3: Science and Technology		12
School-specified courses	MA1508	Calculus (4 CU)	9
	CS2311/CS2315	Computer Programming (3 CU)	
	SDSC1001	Introduction to Data Science (2 CU)	
School Requirement (4 credit units)			
Mathematics	MA1503	Linear Algebra with Applications	4
Total no. of Credit Units:			34

[^]Students who are interested in declaring major in BEng Data and System Engineering (DSE) are encouraged to enroll in GE2339 Smart City – a Systems Engineering Perspective in Semester A to fulfill the BEng DSE major requirement. GE2339 will be required for fulfilling the major requirement of the BEng DSE programme, and cannot be double-counted to fulfill the Gateway Education requirements.

5 ACADEMIC REGULATIONS AND GUIDELINES

Students should observe the University's academic regulations and guidelines at all times. More information can be available by referring to the following websites maintained by the Academic Regulations and Records Office (ARRO).

ARRO Homepage: <http://www.cityu.edu.hk/arro/>

6 ACADEMIC HONESTY

Academic honesty is central to the conduct of academic work. Students are responsible for knowing and understanding the Rules on Academic Honesty. To enhance students' understanding on academic honesty, all students are required to complete a tutorial on academic honesty and make a declaration on their understanding of this core academic principle online on or before **30 November 2019** in order to access their course grades. For details, please refer to ARRO website: http://www.cityu.edu.hk/provost/academic_honesty/.

7 ACADEMIC ADVISING

Under the 4-year degree structure, all first-year students will take a common first-year curriculum. To ease their transition to a new environment, and to provide academic advice for students on their choices of major, academic advising plays a vital role in enhancing students' overall learning experience at CityU.

7.1 Academic Advisors

Students are expected to have at least two meetings per semester with their respective academic advisors, one for course selection and another for review of university life. Other than the meetings, students should keep in contact with their respective academic advisors regularly (e.g. via emails or other means).

Roles of academic advisors:

- building rapport with the students, and serving as a bridge that connects them to the School;
- helping students to consider and clarify their intellectual, professional and personal goals;
- helping students to develop an appropriate study plan (particularly with regard to their major), and assisting in their selection of appropriate courses to achieve their identified goals;
- advising students on academic regulations and requirements, particularly those relating to the major;
- identifying students with special learning needs or early signs of learning problems, and referring/encouraging them to seek help or support; and
- being accessible and available to students, and responding to their questions and concerns.

7.2 Student Advisees

Effective student advising requires an active participation of student advisees in the process.

Responsibilities of student advisees:

- understanding the academic regulations and common first-year curriculum, as well as the requirements of their intended major;
- obtaining information actively, and consult academic advisors on a regular basis and as needed; and
- taking the final responsibility for making decisions and choices regarding their academic study based on the information and advice given.

7.3 Student Development Services (SDS)

The SDS offers many student-centred services to students. It provides support and assistance for students in the following areas:

- Attainment of an all-round development
- Enrichment of campus life
- Development of career plans and choices
- Solving personal problems
- Enhancement of physical and mental well-being
- Provision of financial assistance
- Scholarship application
- Welfare provisions

8 COMMUNICATIONS

Listed below are the normal channels of communication between students and courses / major / School:

- a) Students having difficulties in a course of study should first talk to the course instructor concerned.
- b) A student who wishes to discuss the overall organization of the major should speak to the Major Leader or Deputy Major Leader.
- c) The SDSC Joint Staff & Student Consultative Committee helps to facilitate consultation and communication. A student from each entry cohort will be elected to sit in the Committee.
- d) In addition, a student from each entry catalogue term will be elected to sit in the Major Programme Committee which meets every semester to discuss major-related matters.
- e) Students should feel free to approach their respective academic advisors for advice regarding their study plan or personal and career development.

9 MAJOR LEADERS

School of Data Science (Common First Year)

Major Leader:	Dr ZHANG, Zijun	3442-5328	zijzhang@cityu.edu.hk
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Bachelor of Science in Data Science

Major Leader:	Dr ZHOU, Xiang	3442-6421	xizhou@cityu.edu.hk
Deputy Major Leader:	Dr ZHANG, Qingpeng	3442-4727	qingpeng.zhang@cityu.edu.hk

Bachelor of Engineering in Data and Systems Engineering

Major Leader:	Dr ZHANG, Zijun	3442-5328	zijzhang@cityu.edu.hk
Deputy Major Leader:	Dr HO, Chin Pang Clint	3442-4031	chinpho@cityu.edu.hk

10 INFORMATION TO NEW STUDENTS

10.1 How to access your Personal Class Schedule

- i) Go to <http://www.cityu.edu.hk> from any terminal on campus or off campus, then point to “Quick Links” at the top and click “AIMS”.
- ii) Log onto AIMS.
- iii) Click "Course Registration" menu.
- iv) Click "Weekly Schedule", choose the appropriate term and press "Submit".
- v) You will find your class schedule in matrix form.
- vi) Press the "View Detail Schedule" button at the bottom of your matrix timetable to display details of your class schedule.

10.2 How to get Instructors' handouts through Canvas

- i) Log onto the CityU e-Portal from any terminal on campus or off campus.
- ii) Enter the course under “My Courses”
- iii) Click “Files”.

10.3 How to check Major Programme Requirement and Course Syllabi

Go to the CityU home page and click “Academic Programmes”.

10.4 Course Registration for Semester A 2019-2020

For Semester A 2019-2020, students will be pre-registered in required courses and major electives in most cases if possible.

- i) The date for release of your class schedule is **30 July 2019**. Please check your curriculum requirements, review your study plan and then make appropriate adjustments to your pre-registered courses.
- ii) Add/Drop of courses can be made through AIMS for web-enabled courses during the web registration period. For non-web-enabled courses, approval is required from the major department and you can submit your change request by using the paper Add/Drop Form.

How to do the Add/Drop:

- Go to <http://www.cityu.edu.hk> from any terminal on campus or off campus and click “AIMS”.
- Log onto “AIMS” and then click “Course Registration”.
- Choose “Add or Drop Classes”.
- Select and choose the correct term.

- iii) Web registration begins on **19 August 2019** but you need to check your time ticket first from “AIMS”.
- iv) All add/drops end at **11:30pm, 9 September 2019**.
- v) Details of course registration arrangements for Semester A 2019/20 will be available near the end of July 2019. For details, please refer to ARRO website:
<http://www.cityu.edu.hk/arro/content.asp?cid=163>

10.5 How to access your Student Email Account

- i) Access <http://www.cityu.edu.hk> and point to “Quick Links” at the top of the screen and select “Email”.
- ii) In the Email Services home page, click “@my.cityu.edu.hk” under column of “Student” to go to CityU Office 365 Web Logon.
- iii) Read through the whole page if you are not familiar with webmail. Then click button “O365 Sign-in page” at the bottom.
- iv) Enter Sign-in ID in such format “YourEID-c@ad.cityu.edu.hk” and click “Next”.
- v) Click “Sign in” after keying in password.

Important notes:

For email communication:

Please state your *student name, number and contact telephone number*.

10.6 Credit Exemption

Applications for credit exemption must be made before the first semester of the student’s admission. Students granted course exemption are required to take other courses to make up the credits required for fulfilling the award requirements. For Semester A 2019-2020, the application period is from **15 July to 31 August 2019**. For details, please refer to ARRO website: <http://www6.cityu.edu.hk/arro/content.asp?cid=10>.

10.7 Administrative Support from General Office

Mon to Fri	9:00am to 5:30 pm
Lunch Break	12:30pm to 1:45pm
Sat, Sun & Public Holiday	Closed
Inquiry:	3442-7887
Fax:	3442-0173
Email:	sdscgo@cityu.edu.hk

Appendix I : Overview of Majors

Bachelor of Science in Data Science

Award title: Bachelor of Science in Data Science
理學士(數據科學)

Major leader: Dr ZHOU, Xiang
Email: xizhou@cityu.edu.hk
Tel: 3442 6421

General enquiry: School of Data Science
Email: sdscgo@cityu.edu.hk
Tel: 3442 7887

1. Aims of the Major

This major is to provide graduates in data science with essential trainings of quantitative knowledge, statistical theory, data mining technology and computing tools for the effective use and analysis of big and complex data for real-worlds applications that involve making sense of complex data to realize planning and decision making. The major develops the strong and interdisciplinary trainings in the ability to build data analysis reasoning, communication skills and ethic awareness in realistic inter-professional settings for commercial or public policy problems in various disciplines.

2. What You Will Be Studying

The BSc Data Science aims to provide data science graduates with essential training in the quantitative methods, statistical analysis techniques, data mining technology and computing tools required for the effective use and analysis of big and complex data for real-world applications that involve making sense of complex data to realize planning and decision making. The programme develops strong and interdisciplinary training in the ability to build data analysis reasoning, communication skills and ethic awareness in realistic inter-professional settings for commercial or public policy problems in various disciplines.

The programme provides three flexible modules of advance knowledge:

- Artificial Intelligence
- Social Media Analytics
- Statistical Learning

3. Career Prospects

The unique power of data science knowledge and technology is gaining unprecedented attention in the job market, as big data analytics, data mining, machine learning and artificial intelligence become more and more relevant to mainstream industries. It is no wonder that data science has been heralded by the Harvard Business Review as one of the hottest fields in the 21st century. Data scientists solve some of the hardest problems that businesses face, and their work is relevant to almost all realms of business.

CityU's BSc Data Science is an elite programme to offer students a rigorous theoretical and methodological knowledge of data science along with in-depth analysis and evaluation for applied problems. Graduates with such solid theoretical knowledge and rich practical

experience capable of working alongside domain experts are in great demand in virtually all fields, including but not limited to the following.

- Finance and Banking
- Innovative Industry
- E-commerce
- IT and Software Companies
- Smart City
- Logistics and Transportation Systems
- Retail and Digital Marketing
- Power and Energy
- Healthcare and Medical Research
- Government and Public Organisations
- Consultancy
- Education and Research
- Small Business, Start-ups, Multi-industry Opportunities

4. Student Exchange/Internship

The School provides student exchange and internship opportunities to our students to gain international perspectives, global engagement and industry experience.

Students may choose between the overseas student exchange opportunities at world-leading institutions provided by the School or the University. Paying the tuition at CityU, students will spend a study semester abroad and may transfer the academic credits earned at the host institution to fulfil the graduation requirement.

The School also partners with premier corporates in a wide range of sectors to offer internship opportunities relevant to our majors. With these placements, students are expected to gain practical knowledge and hands-on experience in real-world applications.

Bachelor of Engineering in Data and Systems Engineering

Award title: Bachelor of Engineering in Data and Systems Engineering
工學士(數據與系統工程)

Major leader:	Dr ZHANG, Zijun Email: zijzhang@cityu.edu.hk Tel: 3442 5328
General enquiry:	School of Data Science Email: sdscgo@cityu.edu.hk Tel: 3442 7887

1. Aims of the Major

This major aims at equipping students with strong analytical and decision-making skills in *analyzing, managing, and improving* nowadays *enterprise class systems* via offering solid disciplines in data science and intelligent systems. An *enterprise* under consideration can mean an engineering, business, governmental, or service-oriented organization. The targets of management and improvement can be the strategies, *operations* and supply chain of an enterprise, and the *products* and *services* offered by an enterprise. A BENG DSE student is nurtured to become an analytical and versatile graduate, competent in collecting, analyzing and interpreting large data and transforming the massive information into relevant insights for making better decisions in his or her organization.

In addition to the general education studies and language proficiency, to equip BENG DSE graduates with the competence needed, this Major includes the following core and elective components:

- University level mathematics and essential computer studies;
- Core components – (a) a broad understanding of the principles, techniques, and problem-solving skills in statistics, machine learning, artificial intelligence, optimization, and information technology, as a way to obtain and analyze information from large enterprise datasets, data streams and complex systems. (b) fundamental concepts and techniques in systems/enterprise engineering and management;
- Elective components – more advanced concepts and techniques in systems analytics, in internet of things, and in smart city;
- Problem solving, teamwork and integration skills development;

Purposefully designed courses that infuse CityU's unique discovery-enriched curriculum (DEC) concept.

2. What You Will Be Studying

Offering a solid foundation in data science and intelligent systems, the BEng Data and Systems Engineering programme equips students with strong analytical and decision-making skills, enabling them to analyse, manage and improve enterprise-class systems. The enterprises considered may be businesses, governmental institutions or service-oriented engineering organisations. The targets of management and improvement may be an enterprise's strategies, operations and supply chain, or its products and services. BEng Data and Systems Engineering students are nurtured to become analytically minded and versatile

graduates capable of collecting, analysing and interpreting big data and transforming these massive amounts of information into insights into ways of improving decision making in their organisations.

Students may opt for advanced knowledge in the below categories:

- Systems Analytics
- Internet of Things (IoT)
- Smart City

3. Professional Accreditation

The Major is designed to meet the accreditation requirement of the Hong Kong Institution of Engineers (HKIE). Accreditation from HKIE will be sought.

4. Career Prospects

The unique power of data science knowledge and technology is gaining unprecedented attention in the job market, as big data analytics, data mining, machine learning and artificial intelligence become more and more relevant to mainstream industries. It is no wonder that data science has been heralded by the Harvard Business Review as one of the hottest fields in the 21st century. Data scientists solve some of the hardest problems that businesses face, and their work is relevant to almost all realms of business.

CityU's BEng Data and Systems Engineering is an elite programme to offer students a solid foundation in data science analytics, fostering their ability to apply emerging data science knowledge and technologies to produce advanced solutions to real emerging system-level business and industrial problems. Graduates with such solid theoretical knowledge and rich practical experience capable of working alongside domain experts are in great demand in virtually all fields, including but not limited to the following.

- Finance and Banking
- Innovative Industry
- E-commerce
- IT and Software Companies
- Smart City
- Logistics and Transportation Systems
- Retail and Digital Marketing
- Power and Energy
- Healthcare and Medical Research
- Government and Public Organisations
- Consultancy
- Education and Research
- Small Business, Start-ups, Multi-industry

5 Student Exchange/Internship

The School provides student exchange and internship opportunities to our students to gain international perspectives, global engagement and industry experience.

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will spend a study semester abroad and may transfer the academic credits earned at the host institution to fulfil the graduation requirement.

The School also partners with premier corporates in a wide range of sectors to offer internship opportunities relevant to our majors. With these placements, students are expected to gain practical knowledge and hands-on experience in real-world applications.

Appendix II : Model Study Path

Model Study Path for BSc in Data Science 2019/2020 (normative 4-year)

Yr	Sem	Major Requirements					University Requirements				CUs
2019 / 20 (Year 1)	A	School Specified - MA1508 Calculus (4)	School Specified - CS2311/CS2315 Computer Programming (3)				English 1 - GE1401 University English (3)		Gateway Education 1 (3)	Gateway Education 2 (3)	16
	B	School Specified - SDSC1001 Introduction to Data Science (2)	School Requirement - MA1503 Linear Algebra with Applications (4)				English 2 - Discipline-specific English GE2401 English for Science (3)	GE1501 Chinese Civilisation – History and Philosophy (3)	Gateway Education 3 (3)	Gateway Education 4 (3)	18
	S										0
2020 / 21 (Year 2)	A	School Requirement - MA2506 Probability and Statistics (4)	School Requirement - MA2508 Multi-variable Calculus (4)	School Requirement - SDSC2001 Python for Data Science (3)	SDSC2004 Data Visualization (3)	CS3334 Data Structures (3)					17
	B	School Requirement - CS3402 Database Systems (3)	SDSC2002 Convex Optimization (3)	SDSC2005 Introduction to Computational Social Science (3)	MS2602 Statistical Inference (3) / SDSC2102 Statistical Methods and Data Analysis (3)						12
	S										0
2021 / 22 (Year 3)	A	SDSC3006 Fundamentals of Machine Learning I (3)	SDSC3007 Advanced Statistics (3)	Major Elective 1 (3)	Major Elective 2 (3)	Free Elective 1 (3)					15
	B	SDSC2003 Human Contexts and Ethics in Data Science (3)	CS3273 Data Protection and System Security (3)	Major Elective 3 (3)	Major Elective 4 (3)	Free Elective 2 (3)					15
	S										0
2022 / 23 (Year 4)	A	SDSC4116 Data Science Capstone (3)	Major Elective 5 (3)	Major Elective 6 (3)	Free Elective 3 (3)	Free Elective 4 (3)					15
	B	SDSC4116 Data Science Capstone (3)	Major Elective 7 (3)	Free Elective 5 (3)	Free Elective 6 (3)						12
() indicates number of credit units							Total credits required = 120				

Model Study Path for BEng in Data and Systems Engineering 2019/2020 (normative 4-year)

Yr	Sem	Major Requirements					University Requirements				CUs
2019 / 20 (Year 1)	A	School Specified - MA1508 Calculus (4)	School Specified - CS2311/2315 Computer Programming (3)	GE2339 Smart City – a Systems Engineering Perspective (3)			English 1 - GE1401 University English (3)		Gateway Education 1 (3)		16
	B	School Specified - SDSC1001 Introduction to Data Science (2)	School Requirement - MA1503 Linear Algebra with Applications (4)				English 2 - Discipline-specific English GE2410 English for Engineering (3)	GE1501 Chinese Civilisation – History and Philosophy (3)	Gateway Education 2 (3)	Gateway Education 3 (3)	18
	S										0
2020 / 21 (Year 2)	A	School Requirement - MA2506 Probability and Statistics (4)	School Requirement - MA2508 Multi-variable Calculus (4)	School Requirement - SDSC2001 Python for Data Science (3)	PHY1201 General Physics I (3)	SDSC2004 Data Visualization (3)					17
	B	School Requirement - CS3402 Database Systems (3)	SDSC2002 Convex Optimization (3)	SDSC3020 Engineering Economics (3)	SDSC3060 Operations Research (3)	SDSC3102 Quality Technologies (3)			Gateway Education 4 (3)		18
	S										0
2021/ 22 (Year 3)	A	SDSC3006 Fundamentals of Machine Learning I (3)	SDSC3008 Systems Dynamics and Control (3)	SEEM4026 Systems Modelling, Optimization and Simulation (3) / SDSC4026 Systems Modelling and Simulation (3)	Major Elective 1 (3)	Free Elective 1 (3)					15
	B	SDSC2102 Statistical Methods and Data Analysis (3)	SDSC3002 Data Mining (3)	SDSC4107 Financial Engineering and Analytics (3)	Major Elective 2 (3)						12
	S										0
2022 / 23 (Year 4)	A	SDSC4116 Data Science Capstone (3)	CS4480 Data-Intensive Computing (3)	SDSC4103 Decision Analytics and Risk Management (3)	Free Elective 2 (3)						12
	B	SDSC4116 Data Science Capstone (3)	SDSC4066 Professional Engineering Practice (3)	Major Elective 3 (3)	Free Elective 3 (3)						12
() indicates number of credit units							Total credits required = 120				

Note:

Students who are interested in declaring major in BEng Data and System Engineering (DSE) are encouraged to enroll in GE2339 Smart City – a Systems Engineering Perspective in Semester A to fulfill the BEng DSE major requirement. GE2339 will be required for fulfilling the major requirement of the BEng DSE programme, and cannot be double-counted to fulfill the Gateway Education requirements.